4.2 PERFORMANCE TEST

The performance test was conducted three times respectively on ballasting and de-ballasting respectively in TRC:200m^3/h and TRC:300-m^3/h (The date of tests are: TRC: 200m^3/h: the first time Aug. 5, 2013 ballasting and Aug. 6, 2013 de-ballasting,the second time Aug. 16, 2013 ballasting and Aug. 17, 2013 de-ballasting,the third time Aug. 26, 2013 ballasting and Aug. 27, 2013 de-ballasting,and TRC:300m^3/h: the first time Sep. 9, 2013 ballasting and Sep. 10, 2013 de-ballasting, the second time Oct. 7, 2013 ballasting and Oct. 8, 2013 de-ballasting, the third time Dec. 9, 2013 ballasting and Dec. 10, 2013 de-ballasting).

The isokinetic flow rate of the sample was conducted from the ballast line, and it was obtained using the sampling device (Defigor).

The test results are shown below.

L SIZE GROUP
(Organisms of greater than or equal to 50 micrometer in minimum dimension)

The analysis results of L size group are shown in Table 4-2-1 (1) - (3) regarding TRC: 200m^3/h three performance tests in total (the first time Aug. 5, 2013 ballasting and Aug. 6, 2013 de-ballasting, the second time Aug. 16, 2013 ballasting and Aug. 17, 2013 de-ballasting, the third time Aug. 26, 2013 ballasting).

The analysis results of L size group are shown in Table 4-2-1 (4) - (6) regarding TRC:300m3/h three performance tests in total (the first time Sep. 9, 2013 ballasting and Sep. 10, 2013 de-ballasting, the second time Oct. 7, 2013 ballasting and Oct. 8, 2013 de-ballasting, the third time Dec. 9, 2013 ballasting and Dec. 10, 2013 de-ballasting).

All the samples met the requirements for L size of intended water on ballasting (not less than 100 individuals/m^3) and on de-ballasting (not less than ten individuals/m^3), and the density of the treated water on de-ballasting was less than the ballast water discharged standard (less than ten individuals/m^3).

S SIZE GROUP

(Organisms of greater than or equal to 10 micrometers and less than 50 micrometers in minimum dimension)

The analysis results of S size group are shown in Table 4-2-1 (1) - (3) regarding TRC:200m^3/h three performance tests in total (the first time Aug. 5, 2013 ballasting and Aug. 6, 2013 de-ballasting,the second time Aug. 16, 2013 ballasting and Aug. 17, 2013 de-ballasting,the third time Aug. 26, 2013 ballasting).

The analysis results of S size group are shown in Table 4-2-1 (4) - (6) regarding TRC:300m^3/h three performance tests in total (the first time Sep. 9, 2013 ballasting and Sep. 10, 2013 de-ballasting, the second time Oct. 7, 2013 ballasting and Oct. 8, 2013 de-ballasting, the third time Dec. 9, 2013 ballasting and Dec. 10, 2013 de-ballasting).

All the samples met the requirements for S size group of intended water on ballasting (not less than 100 individuals/ml) and on de-ballasting (not less than ten individuals/ml) and the treated water on de-ballasting was less than the ballast water discharged standard (less than ten individuals/ml).

Table 4-2-1 (1) TRC : 200m^3/hThe first performance test. Analysis results of L size and S size group.

Date		2013/8/5			2013/8/6											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	6	7	6	7	7	6	1	ND	ND	ND	ND	1	ND	2	2
	Species (m^{-3})	16	19	16	16	15	14	1	ND	ND	ND	ND	2	ND	2	2
	Density (m^{-3})	544,800	520,900	481,900	235,680	269,520	195,840	1	ND	ND	ND	ND	2	ND	3	2
S size group	Phyla/Divisions (m^{-3})	4	4	4	4	3	4	1	1	ND	ND	1	ND	ND	ND	ND
	Species (m^{-3})	14	15	14	12	8	8	1	1	ND	ND	1	ND	ND	ND	ND
	Density (m^{-3})	589	236	190	163	159	84	0.01	0.02	ND	ND	0.02	ND	ND	ND	ND

N.D.: no detection of organism

Table 4-2-1 (2) TRC : 200m^3/hThe second performance test. Analysis results of L size and S size group.

Date		2013/8/16			2013/8/17											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	6	5	7	6	6	7	1	2	1	1	ND	1	1	1	ND
	Species (m^{-3})	13	13	14	13	12	14	1	3	1	1	ND	1	1	1	ND
	Density (m^{-3})	98,700	222,600	130,200	50,800	80,800	83,120	2	4	1	1	ND	1	1	1	ND
S size group	Phyla/Divisions (m^{-3})	4	3	4	3	3	3	ND	ND	ND	ND	ND	ND	1	ND	ND
	Species (m^{-3})	14	14	12	14	9	10	ND	ND	ND	ND	ND	ND	1	ND	ND
	Density (m^{-3})	126	107	100	64	63	76	ND	ND	ND	ND	ND	ND	0.01	ND	ND

N.D.: no detection of organism

Table 4-2-1 (3) TRC : 200m^3/hThe third performance test. Analysis results of L size and S size group.

Date		2013/8/26			2013/8/27											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	7	7	7	6	6	6	3	3	ND	5	3	1	2	1	2
	Species (m^{-3})	11	10	11	8	12	12	4	5	ND	5	5	1	2	1	3
	Density (m^{-3})	78,200	38,700	68,800	11,540	10,160	9,198	5	9	ND	8	10	1	3	1	3
S size group	Phyla/Divisions (m^{-3})	4	4	4	4	3	3	2	ND	ND	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	16	9	12	9	4	8	2	ND	ND	ND	ND	ND	ND	ND	ND
	Density (m^{-3})	165	109	104	101	16	24	0.06	ND	ND	ND	ND	ND	ND	ND	ND

N.D.: no detection of organism

Table4-2-1 (4) TRC:300m^3/hThe first performance test　Analysis results of L size and S size group

Date		2013/9/9			2013/9/10											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	6	5	6	5	5	6	3	ND	ND	1	ND	2	1	1	1
	Species (m^{-3})	15	13	14	14	13	14	3	ND	ND	1	ND	5	3	1	6
	Density(m^{-3})	114,480	161,800	129,280	60,480	82,800	80,460	3	ND	ND	1	ND	6	3	1	11
S size group	Phyla/Divisions (m^{-3})	3	4	4	4	3	3	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	9	13	13	13	10	12	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Density(m^{-3})	226	215	207	128	89	149	ND	ND	ND	ND	ND	ND	ND	ND	ND

N.D.: no detection of organism

Table 4-2-1 (5)TRC:300m^3/h The second performance test　Analysis results of L size and S size group

Date		2013/10/7			2013/10/8											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	6	5	6	5	5	5	1	ND	1	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	15	13	12	10	10	11	1	ND	1	ND	ND	ND	ND	ND	ND
	Density(m^{-3})	591,300	503,100	522,400	196,650	313,700	467,400	1	ND	1	ND	ND	ND	ND	ND	ND
S size group	Phyla/Divisions (m^{-3})	4	4	4	2	3	1	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	14	17	15	9	10	8	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Density(m^{-3})	127	141	111	40	48	54	ND	ND	ND	ND	ND	ND	ND	ND	ND

N.D.: no detection of organism

Table 4-2-1 (6)　TRC:300m^3/h The third performance test　Analysis results of L size and S size group

Date		2013/12/9			2013/12/10											
Port		Ariake (Ballasting)			Ariake (De-ballasting)											
Sample		Control			Control			Treated water, Beginning			Treated water, Midterm			Treated water, End		
		Beginning	Midterm	End	Beginning	Midterm	End	①	②	③	①	②	③	①	②	③
L size group	Phyla/Divisions (m^{-3})	6	10	5	6	7	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	20	25	14	14	19	16	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Density(m^{-3})	43,900	184,500	14,700	6,500	5,320	7,000	ND	ND	ND	ND	ND	ND	ND	ND	ND
S size group	Phyla/Divisions (m^{-3})	3	3	3	1	2	2	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Species (m^{-3})	9	7	10	3	6	5	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Density(m^{-3})	147	177	216	79	69	71	ND	ND	ND	ND	ND	ND	ND	ND	ND

N.D.: no detection of organism

BACTERIA

The analysis results of bacteria are shown in Table 4-2-3 (1) - (3) regarding TRC:200m^3/h three performance tests in total (the first time Aug. 5, 2013 ballasting and Aug. 6, 2013 de-ballasting,the second time Aug. 16, 2013 ballasting and Aug. 17, 2013 de-ballasting,the third time Aug. 26, 2013 ballasting).

The analysis results of bacteria are shown in Table 4-2-3 (4) - (6) regarding TRC:300m^3/h three performance tests in total (the first time Sep. 9, 2013 ballasting and Sep. 10, 2013 de-ballasting, the second time Oct. 7, 2013 ballasting and Oct. 8, 2013 de-ballasting, the third time Dec. 9, 2013 ballasting and Dec. 10, 2013 de-ballasting).

(1) *Escherichia coli*

On de-ballasting, the density of *Escherichia coli* in treated water was less than the ballast water discharged standard (less than 250 cfu/100 ml) in all the samples.

(2) Intestinal *Enterococci*

On de-ballasting, the density of Intestinal *Enterococci* in treated water was less than the ballast water discharged standard (less than 100 cfu/100 ml) in all the samples.

(3) Toxicogenic *Vibrio cholera* (serotype O-1 and O-139)

On de-ballasting, the density of Toxicogenic *Vibrio cholera* (O-1andO-139) in treated water was less than the ballast water discharged standard (less than 1 cfu/100 ml) in all the samples.

Table 4-2-3(1) TRC:200m^3/hThe first performance test Analysis results of bacteria

Shipboard 1st 2013/8/5-8/6

			Heterotrophic bacteria (Sea water medium)	Heterotrophic bacteria (Fresh water medium)	*Vibrio cholera* (First-stage)	*Vibrio cholera* (Second-stage)	Toxicogenic *Vibrio cholera*	Coliform	*Escherichia coli*	Enterococcus group	Intestinal *Enterococci*
			(cfu/ml)		(cfu/100ml)			(cfu/100ml)		(cfu/100ml)	
Treated water	Beginning	①	222	2.0	138	N.D.	N.D.	104	2.2	N.D.	N.D.
		②	444	N.D.	170	N.D.	N.D.	99	14	N.D.	N.D.
		③	448	2.0	188	N.D.	N.D.	58	1.6	N.D.	N.D.
	Midterm	①	210	N.D.	166	N.D.	N.D.	47	0.6	N.D.	N.D.
		②	142	N.D.	77	N.D.	N.D.	43	0.6	N.D.	N.D.
		③	332	N.D.	172	N.D.	N.D.	60	0.8	N.D.	N.D.
	End	①	424	2.0	242	N.D.	N.D.	59	N.D.	N.D.	N.D.
		②	180	N.D.	138	N.D.	N.D.	47	2.0	N.D.	N.D.
		③	746	N.D.	228	N.D.	N.D.	139	7.6	N.D.	N.D.
Control water	Ballasting	Beginning	398000	150	12200	N.D.	N.D.	8600	N.D.	N.D.	N.D.
		Midterm	238000	158	7000	N.D.	N.D.	4000	400	N.D.	N.D.
		End	242000	194	4800	N.D.	N.D.	3200	N.D.	N.D.	N.D.
	De-ballasting	Beginning	510000	414	34000	N.D.	N.D.	7400	200	N.D.	N.D.
		Midterm	446000	246	41600	N.D.	N.D.	8600	N.D.	N.D.	N.D.
		End	370000	498	39800	N.D.	N.D.	5200	N.D.	N.D.	N.D.

N.D.: no detection of bacteria

Table 4-2-3 (2) TRC:200m^3/hThe second performance test Analysis results of bacteria

Shipboard 2nd 2013/8/16-8/17

			Heterotrophic bacteria (Sea water medium)	Heterotrophic bacteria (Fresh water medium)	*Vibrio cholera* (First-stage)	*Vibrio cholera* (Second-stage)	Toxicogenic *Vibrio cholera*	Coliform	*Escherichia coli*	Enterococcus group	Intestinal *Enterococci*
			(cfu/ml)		(cfu/100ml)			(cfu/100ml)		(cfu/100ml)	
Treated water	Beginning	①	17420	50	3300	N.D.	N.D.	2320	160	N.D.	N.D.
		②	7720	8.0	2160	21.6	N.D.	1625	200	N.D.	N.D.
		③	11780	28	4480	N.D.	N.D.	5160	240	N.D.	N.D.
	Midterm	①	19780	46	4660	N.D.	N.D.	5720	220	N.D.	N.D.
		②	13780	8.0	4660	N.D.	N.D.	4020	240	N.D.	N.D.
		③	12340	4.0	4420	N.D.	N.D.	3740	160	N.D.	N.D.
	End	①	17860	10	5060	N.D.	N.D.	5240	220	N.D.	N.D.
		②	19040	12	5500	N.D.	N.D.	5300	80	N.D.	N.D.
		③	12440	4.0	4220	N.D.	N.D.	2200	200	N.D.	N.D.
Control water	Ballasting	Beginning	62200	288	6000	N.D.	N.D.	7600	N.D.	N.D.	N.D.
		Midterm	72600	220	8000	N.D.	N.D.	5600	400	N.D.	N.D.
		End	82800	310	8200	N.D.	N.D.	9800	N.D.	N.D.	N.D.
	De-ballasting	Beginning	226000	148	21200	1484	N.D.	8400	400	N.D.	N.D.
		Midterm	228000	146	22800	2280	N.D.	4800	N.D.	N.D.	N.D.
		End	218000	152	30400	1216	N.D.	4000	N.D.	N.D.	N.D.

Table 4-2-3 (3) TRC:200m^3/h The third performance test Analysis results of bacteria

Shipboard 3rd 2013/8/26-8/27

			Heterotrophic bacteria (Sea water medium)	Heterotrophic bacteria (Fresh water medium)	*Vibrio cholera* (First-stage)	*Vibrio cholera* (Second-stage)	Toxicogenic *Vibrio cholera*	Coliform	*Escherichia coli*	Enterococcus group	Intestinal *Enterococci*
			(cfu/ml)		(cfu/100ml)			(cfu/100ml)		(cfu/100ml)	
Treated water	Beginning	①	560	18	336	N.D.	N.D.	156	68	N.D.	N.D.
		②	274	4.0	172	N.D.	N.D.	80	28	N.D.	N.D.
		③	56	4.0	72	N.D.	N.D.	36	8.0	N.D.	N.D.
	Midterm	①	324	8.0	348	N.D.	N.D.	204	48	N.D.	N.D.
		②	588	20	580	12	N.D.	252	16	N.D.	N.D.
		③	520	10	636	6.4	N.D.	352	48	N.D.	N.D.
	End	①	702	18	632	N.D.	N.D.	388	64	N.D.	N.D.
		②	1636	40	1016	N.D.	N.D.	704	68	N.D.	N.D.
		③	1810	52	896	N.D.	N.D.	636	152	N.D.	N.D.
Control water	Ballasting	Beginning	52400	632	5960	60	N.D.	7400	600	0.2	0.2
		Midterm	57400	488	6280	63	N.D.	10600	200	0.4	0.4
		End	59400	508	6080	122	N.D.	8000	200	N.D.	N.D.
	De-ballasting	Beginning	212000	738	64400	N.D.	N.D.	7400	2800	N.D.	N.D.
		Midterm	129200	566	38400	384	N.D.	7200	1400	N.D.	N.D.
		End	96200	562	36000	720	N.D.	7400	1800	3.6	0.6

N.D.: no detection of bacteria

Table 4-2-3 (4) TRC: 300m^3/h The first performance test Analysis results of bacteria

Shipboard 1st 2013/9/9-9/10

			Heterotrophic bacteria (Sea water medium) (cfu/ml)	Heterotrophic bacteria (Fresh water medium) (cfu/ml)	*Vibrio cholera* (First-stage) (cfu/100ml)	*Vibrio cholera* (Second-stage) (cfu/100ml)	Toxicogenic *Vibrio cholera* (cfu/100ml)	Coliform (cfu/100ml)	*Escherichia coli* (cfu/100ml)	Enterococcus group (cfu/100ml)	Intestinal *Enterococci* (cfu/100ml)
Treated water	Beginning	①	660	6.0	48	N.D.	N.D.	80	32	N.D.	N.D.
		②	7420	12	304	N.D.	N.D.	144	24	N.D.	N.D.
		③	8280	12	320	N.D.	N.D.	284	136	N.D.	N.D.
	Midterm	①	4240	10	176	N.D.	N.D.	120	64	N.D.	N.D.
		②	2000	4.0	80	N.D.	N.D.	52	28	N.D.	N.D.
		③	20	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	End	①	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Control water	Ballasting	Beginning	21200	618	800	20	N.D.	1800	420	5.6	4.0
		Midterm	10200	400	380	40	N.D.	680	180	2.8	2.8
		End	27600	620	1260	40	N.D.	7320	700	3.0	2.6
	De-ballasting	Beginning	108800	392	15800	400	N.D.	5000	440	0.6	0.6
		Midterm	94000	358	11600	400	N.D.	5340	1160	1.4	1.0
		End	107400	386	11000	N.D.	N.D.	3240	400	1.4	1.4

N.D.: no detection of bacteria

Table 4-2-3 (5) TRC: 300m^3/h The second performance test Analysis results of bacteria

Shipboard 2nd 2013/10/7-10/8

			Heterotrophic bacteria (Sea water medium) (cfu/ml)	Heterotrophic bacteria (Fresh water medium) (cfu/ml)	*Vibrio cholera* (First-stage) (cfu/100ml)	*Vibrio cholera* (Second-stage) (cfu/100ml)	Toxicogenic *Vibrio cholera* (cfu/100ml)	Coliform (cfu/100ml)	*Escherichia coli* (cfu/100ml)	Enterococcus group (cfu/100ml)	Intestinal *Enterococci* (cfu/100ml)
Treated water	Beginning	①	106	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.3	0.3
		②	40	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.2	0.2
		③	38	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.8	0.8
	Midterm	①	26	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	End	①	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.8	0.8
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Control water	Ballasting	Beginning	2080	74	N.D.	N.D.	N.D.	N.D.	N.D.	0.4	0.2
		Midterm	4900	226	N.D.	N.D.	N.D.	N.D.	N.D.	0.6	0.4
		End	4460	186	20	N.D.	N.D.	20	N.D.	1.4	0.4
	De-ballasting	Beginning	145600	464	19600	N.D.	N.D.	1000	200	0.0	N.D.
		Midterm	150200	404	62200	N.D.	N.D.	1200	200	0.2	0.2
		End	163600	344	22400	N.D.	N.D.	1600	N.D.	0.0	N.D.

N.D.: no detection of bacteria

Table 4-2-3 (6) TRC: 300m^3/h The third performance test Analysis results of bacteria

Shipboard 3rd 2013/12/9-12/10

			Heterotrophic bacteria (Sea water medium) (cfu/ml)	Heterotrophic bacteria (Fresh water medium) (cfu/ml)	*Vibrio cholera* (First-stage) (cfu/100ml)	*Vibrio cholera* (Second-stage) (cfu/100ml)	Toxicogenic *Vibrio cholera* (cfu/100ml)	Coliform (cfu/100ml)	*Escherichia coli* (cfu/100ml)	Enterococcus group (cfu/100ml)	Intestinal *Enterococci* (cfu/100ml)
Treated water	Beginning	①	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.2	N.D.
	Midterm	①	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.2	0.2
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	End	①	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		②	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		③	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Control water	Ballasting	Beginning	30	4.0	N.D.	N.D.	N.D.	N.D.	N.D.	0.2	N.D.
		Midterm	24	2.0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
		End	56	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
	De-ballasting	Beginning	140	2.0	2.0	N.D.	N.D.	N.D.	N.D.	0.4	0.4
		Midterm	146	14	N.D.	N.D.	N.D.	N.D.	N.D.	0.2	N.D.
		End	200	12	2.0	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.

N.D.: no detection of bacteria

WATER QUALITY

In Table 4-2-4, we have shown the measuring results of water temperature and salinity as well as the measurement results of pH, NTU (turbidity), TSS (total suspended solids) and POC (particulate organic carbon),which are required for record at the time of shipboard test.

Table 4-2-4 (1) TRC:200m^3/h The first performance test Analysis results of water quality

TRC:200m^3/h 1st 2013/8/5-8/6

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		27.6	26.4	8.28	7.6	5.3	<0.1
		Midterm		26.9	27.1	7.57	3.4	4.7	<0.1
		End		26.5	27.7	7.32	4.6	4.8	<0.1
	De-ballasting	Beginning		26.8	27.1	8.12	4.3	3.1	<0.1
		Midterm		27.0	27.0	8.13	3.1	3.9	<0.1
		End		27.0	26.9	8.14	4.3	4.1	<0.1
Treated water	Ballasting	Beginning	①	26.1	28.3	8.07	4.7	2.7	<0.1
			②	26.0	28.5	8.09	3.0	2.3	<0.1
			③	26.0	27.7	8.11	3.3	3.5	<0.1
		Midterm	①	26.1	27.7	8.09	3.9	2.5	<0.1
			②	26.3	27.7	8.10	2.8	3.5	<0.1
			③	26.2	27.7	8.14	2.9	4.5	<0.1
		End	①	26.0	27.7	8.12	3.5	1.6	<0.1
			②	26.0	27.7	8.12	3.4	1.7	<0.1
			③	26.0	27.6	8.12	3.2	3.7	<0.1

Table 4-2-4 (2) TRC:200m^3/hThe second performance test Analysis results of water quality

TRC:200m^3/h 2nd 2013/8/16-8/17

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		27.8	27.5	8.10	11.3	5.0	<0.5
		Midterm		27.6	27.5	8.12	10.2	5.8	<0.5
		End		27.6	27.6	8.11	10.2	5.7	<0.5
	De-ballasting	Beginning		28.2	28.9	8.01	6.8	5.8	<0.5
		Midterm		28.2	28.9	8.03	7.0	5.0	<0.5
		End		28.2	28.2	8.04	7.1	5.7	<0.5
Treated water	Ballasting	Beginning	①	27.4	29.6	8.04	1.1	5.0	<0.5
			②	27.2	29.6	8.05	2.8	4.7	<0.5
			③	27.2	29.5	8.05	1.4	4.3	<0.5
		Midterm	①	27.2	29.4	8.05	1.6	4.6	<0.5
			②	27.2	29.4	8.06	0.3	3.4	<0.5
			③	27.2	29.6	8.06	0.2	3.4	<0.5
		End	①	27.1	30.8	8.04	0.8	4.5	<0.5
			②	27.1	30.8	8.04	1.5	4.8	<0.5
			③	27.0	30.9	8.04	0.8	2.2	<0.5

Table4-2-4 (3) TRC:200m^3/hThe third performance test Analysis results of water quality

TRC:200m^3/h 3rd 2013/8/26-8/27

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		27.5	29.0	7.92	4.9	4.3	<0.5
		Midterm		27.3	29.0	7.93	5.1	5.9	<0.5
		End		27.4	28.7	7.93	4.7	5.6	<0.5
	De-ballasting	Beginning		27.1	29.8	7.85	5.8	3.3	<0.5
		Midterm		27.2	28.7	7.84	5.6	5.0	<0.5
		End		27.2	29.6	7.83	5.4	5.7	<0.5
Treated water	Ballasting	Beginning	①	26.4	29.6	8.03	12.1	3.3	<0.5
			②	26.5	29.8	8.04	11.2	5.2	<0.5
			③	26.6	29.6	8.04	12.5	4.7	<0.5
		Midterm	①	26.6	29.5	8.06	11.5	2.9	<0.5
			②	26.7	29.4	8.04	11.0	3.9	<0.5
			③	26.6	29.4	8.06	10.7	4.9	<0.5
		End	①	26.6	29.6	8.06	11.8	3.3	<0.5
			②	26.6	29.7	8.04	11.5	4.3	<0.5
			③	26.6	29.7	8.04	12.5	2.9	<0.5

Table 4-2-4 (4) TRC:300m^3/hThe first performance test Analysis results of water quality

TRC:300m^3/h 1st 2013/9/9-9/10

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		27.9	26.0	8.0	3.6	5.7	<0.5
		Midterm		26.9	26.3	8.0	2.7	5.9	<0.5
		End		26.9	26.8	8.0	3.6	5.4	<0.5
	De-ballasting	Beginning		27.1	26.2	8.0	0.9	4.3	<0.5
		Midterm		27.2	26.0	8.0	1.2	5.4	<0.5
		End		27.2	26.1	8.0	0.0	4.2	<0.5
Treated water	Ballasting	Beginning	①	27.1	26.7	8.0	1.4	4.5	<0.5
			②	27.1	26.6	8.0	1.6	4.2	<0.5
			③	27.2	26.6	8.0	1.2	3.7	<0.5
		Midterm	①	27.1	26.1	8.0	1.1	3.8	<0.5
			②	27.0	26.7	8.0	1.5	3.5	<0.5
			③	27.0	27.6	8.1	1.8	3.2	<0.5
		End	①	27.0	27.5	8.1	1.9	4.6	<0.5
			②	27.0	27.2	8.1	1.9	4.2	<0.5
			③	27.0	27.0	8.1	1.7	4.1	<0.5

Table 4-2-4 (5) TRC:300m^3/hThe second performance test Analysis results of water quality

TRC:300m^3/h 2nd 2013/10/7-10/8

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		22.8	28.8	7.90	3.8	5.0	<0.5
		Midterm		22.8	28.7	7.91	3.9	3.9	<0.5
		End		22.8	29.0	7.91	3.3	3.4	<0.5
	De-ballasting	Beginning		23.3	29.2	7.84	3.0	1.2	<0.5
		Midterm		23.4	29.0	7.85	2.9	4.1	<0.5
		End		23.4	29.2	7.86	3.0	2.7	<0.5
Treated water	Ballasting	Beginning	①	23.1	28.7	7.75	2.9	1.8	<0.5
			②	23.1	28.8	7.86	3.0	3.9	<0.5
			③	23.0	29.2	7.84	2.8	2.3	<0.5
		Midterm	①	23.0	28.9	6.84	3.0	2.7	<0.5
			②	23.3	29.3	7.98	3.0	2.5	<0.5
			③	23.3	29.5	7.96	3.1	2.5	<0.5
		End	①	23.3	29.2	7.94	4.0	1.0	<0.5
			②	23.3	29.2	7.94	3.3	3.4	<0.5
			③	23.3	29.4	7.96	3.4	2.3	<0.5

Table 4-2-4 (6) TRC:300m^3/hThe third performance test Analysis results of water quality

TRC:300m^3/h 3rd 2013/12/9-12/10

				Water temperature (℃)	Salinity (PSU)	pH	NTU	TSS (mg/L)	POC (mg/L)
Control	Ballasting	Beginning		14.9	30.3	7.99	1.6	1.5	<0.5
		Midterm		15.5	30.8	7.98	1.6	2.9	<0.5
		End		15.0	30.6	7.97	1.0	3.8	<0.5
	De-ballasting	Beginning		15.2	30.7	8.03	1.3	2.4	<0.5
		Midterm		15.2	30.7	8.04	0.8	4.1	<0.5
		End		15.1	30.6	8.04	0.9	3.3	<0.5
Treated water	Ballasting	Beginning	①	15.7	31.3	8.00	1.1	3.8	<0.5
			②	15.6	31.4	8.02	0.8	2.5	<0.5
			③	15.6	31.4	8.00	1.1	3.1	<0.5
		Midterm	①	15.6	31.1	8.00	0.9	2.0	<0.5
			②	15.6	31.3	8.03	1.0	3.1	<0.5
			③	15.7	31.4	8.10	1.1	2.5	<0.5
		End	①	15.8	31.4	8.08	1.4	2.2	<0.5
			②	15.7	31.3	8.10	1.3	3.5	<0.5
			③	15.8	31.5	8.11	1.0	2.4	<0.5

(Blank)